AMENDMENTS TO THE CLAIMS

The following listing of claims replaces all previous listings of claims in this application.

1. (Currently amended) An apparatus ~~A system~~ for detecting a target nucleic acid sequence comprising:

a support comprising an electrode and a nucleic acid probe attached thereto, wherein the nucleic acid probe comprises a sequence complementary to the target nucleic acid sequence;

a ~~non-covalent~~ photoelectrochemical label selective for non-covalently binding double-stranded nucleic acids over single-stranded nucleic acids suitable for contacting with the nucleic acid probe;

a sacrificial reductant suitable for contacting with the nucleic acid probe;

a light source of sufficient energy and intensity to initiate a photoelectrochemical reaction of the non-covalent photoelectrochemical label for irradiating the nucleic acid probe; and

a data collection controller for measuring a current at the electrode.

2. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the nucleic acid probe comprises DNA.

3. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the nucleic acid probe comprises RNA.

4. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the target nucleic acid sequence comprises a DNA sequence.

5. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the target nucleic acid sequence comprises an RNA sequence.

6. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the support comprises an array of nucleic acid probe elements.

7. (Currently amended) The apparatus ~~system~~ of claim 6, wherein the array comprises greater than about 10 nucleic acid probe elements.

8. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the electrode comprises at least one of gold, platinum, silicon, glassy carbon, graphite, indium-tin oxide, and diamond.

9. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the non-covalent photoelectrochemical label is a compound comprising:

a metal comprising at least one of ruthenium, osmium, cobalt, rhodium, nickel, and platinum; and

a ligand comprising at least one of polypyridyl ligands, 2,2'-bipyridine, 1,10-phenanthroline, 4,7-diphenyl-1,10-phenanthroline, dipyrido[3,2-a:2',3'-c]phenazine, 9,10-phenanthrenequinone diimine, 2,2':6',2"-terpyridine, and derivatives thereof.

10. (Currently amended) The apparatus ~~system~~ of claim 9, wherein the non-covalent photoelectrochemical label comprises a cation is selected from the group consisting of $[Ru(bipy)3]^{2+}$, $[Ru(bipy)2dppz]^{2+}$, $[Ru(phen)3]^{2+}$, and combinations thereof.

11. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the light source is a laser.

12. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the light source radiates visible light.

13. (Canceled)

14. (Currently amended) The apparatus of claim 1 ~~system of claim 13~~, wherein the sacrificial reductant comprises at least one of a tertiary amine, tripropylamine, ethylenediaminetetraacetic acid, and salts thereof.

15. (Currently amended) The apparatus ~~system~~ of claim 1, further comprising an optical scanner for scanning the support.

16. (Currently amended) The apparatus ~~system~~ of claim 1, further comprising a fluid handling system for the support.

17. (Currently amended) The apparatus ~~system~~ of claim 1, further comprising a temperature control system for the support.

18. (Currently amended) The apparatus ~~system~~ of claim 1, wherein the support further comprises machine readable identifying indicia.

19. (Withdrawn–currently amended) A method for detecting a target nucleic acid sequence comprising:

contacting a nucleic acid probe with a target nucleic acid and a ~~non-covalent~~ photoelectrochemical label selective for non-covalently binding double-stranded nucleic acids over single-stranded nucleic acids to form a reaction mixture, wherein

the nucleic acid probe is attached to an electrode,

the nucleic acid probe comprises a sequence complementary to the target nucleic acid sequence, and

a support comprises the nucleic acid probe and the electrode;

contacting with the nucleic acid probe with a suitable sacrificial reductant;

irradiating the mixture with a light source of sufficient energy and intensity to initiate a photoelectrochemical reaction of the non-covalent photoelectrochemical label; and

observing a photocurrent at the electrode using a data collection controller, wherein the photocurrent indicates the presence and/or amount of the target nucleic acid.

20. (Withdrawn) The method of claim 18, wherein the nucleic acid probe comprises DNA.

21. (Withdrawn) The method of claim 18, wherein the nucleic acid probe comprises RNA.

22. (Withdrawn) The method of claim 18, wherein the target nucleic acid comprises DNA.

23. (Withdrawn) The method of claim 18, wherein the target nucleic acid comprises RNA.

24. (Withdrawn) The method of claim 18, wherein the support comprises an array of nucleic acid probe elements.

25. (Withdrawn) The method of claim 18, wherein the array comprises greater than about 10 nucleic acid probe elements.

26. (Withdrawn) The method of claim 18, wherein the electrode comprises at least one of gold, platinum, silicon, glassy carbon, graphite, indium-tin oxide, and diamond.

27. (Withdrawn) The method of claim 18, wherein the non-covalent photoelectrochemical label is a compound comprising:

a metal comprising at least one of ruthenium, osmium, cobalt, rhodium, nickel, and platinum; and

a ligand comprising at least one of polypyridyl ligands, 2,2'-bipyridine, 1,10-phenanthroline, 4,7-diphenyl-1,10-phenanthroline, dipyrido[3,2-a:2',3'-c]phenazine, 9,10-phenanthrenequinone diimine, 2,2':6',2"-terpyridine, and derivatives thereof.

28. (Withdrawn) The method of claim 27, wherein the non-covalent photoelectrochemical label comprises a cation is selected from the group consisting of $[Ru(bipy)3]^{2+}$, $[Ru(bipy)2dppz]^{2+}$, $[Ru(phen)3]^{2+}$, and combinations thereof.

29. (Withdrawn) The method of claim 18, wherein the nucleic acid probe is irradiated using a laser.

30. (Withdrawn) The method of claim 18, wherein the nucleic acid probe is irradiated with visible light.

31. (Canceled)

32. (Withdrawn) The method of ~~claim 31~~ claim 18, wherein the sacrificial reductant comprises at least one of a tertiary amine, tripropylamine, ethylenediaminetetraacetic acid, and salts thereof.

33. (Withdrawn) The method of claim 30, further comprising maintaining the nucleic acid probe under conditions conducive for nucleic acid hybridization.

34. (Withdrawn) The method of claim 30, further comprising washing the nucleic acid probe to remove excess nucleic acid target.

35. (Withdrawn) The method of claim 30, further comprising washing the nucleic acid probe to remove excess non-covalent photoelectrochemical label.

36–45. (Canceled)